| REPORT DOCUMENTATION PAGE		Form Approved OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE	2. REPORT TYPE Viewgraphs/Slides	3. DATES COVERED
4. TITLE AND SUBTITLE The Joint Test and Training Capability Assessment - Assessing High Level Architecture (HLA) and Training Systems for T&E Use		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Michael L. Payne Kevin S. Gish		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Air Warfare Center Aircraft Division 22347 Cedar Point Road, Unit #6 Patuxent River, Maryland 20670-1161		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		
13. SUPPLEMENTARY NOTES		
14. ABSTRACT		
15. SUBJECT TERMS		

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Michael L. Payne
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (include area code)
Unclassified	Unclassified	Unclassified	SAR	10	(3)1 342-1182

Standard Form 298 (Rev. 8-98)
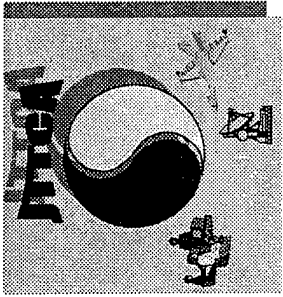Prescribed by ANSI Std. Z39-18

DTIC QUALITY INSPECTED 4

20001012 105

The Joint Test and Training Capability Assessment
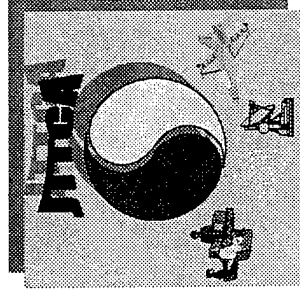
Assessing High Level Architecture (HLA) and Training Systems for T&E Use

Michael L. Payne and Kevin S. Gish

Naval Air Warfare Center Aircraft Division

Atlantic Ranges and Facilities Department

Patuxent River, MD

Project Objectives

The Joint Test and Training Capability Assessment (JTTCA) project is sponsored by the OSD Central Test and Evaluation Investment Program (CTEIP). The JTTCA project has two main objectives:

1. Assess the Joint Tactical Combat Training System (JTCTS) for T&E applications.

2. Assess the DoD High Level Architecture (HLA) for T&E applications by enabling interoperability among open-air range (OAR) assets and with a T&E simulation running in an Installed System Test Facility (ISTF).

This poster paper and demonstration addresses objective 2-- assessing HLA for T&E applications. The JTCTS is still under development. The JTTCA project cannot assess JTCTS for T&E applications until JTCTS equipment is available for assessment.
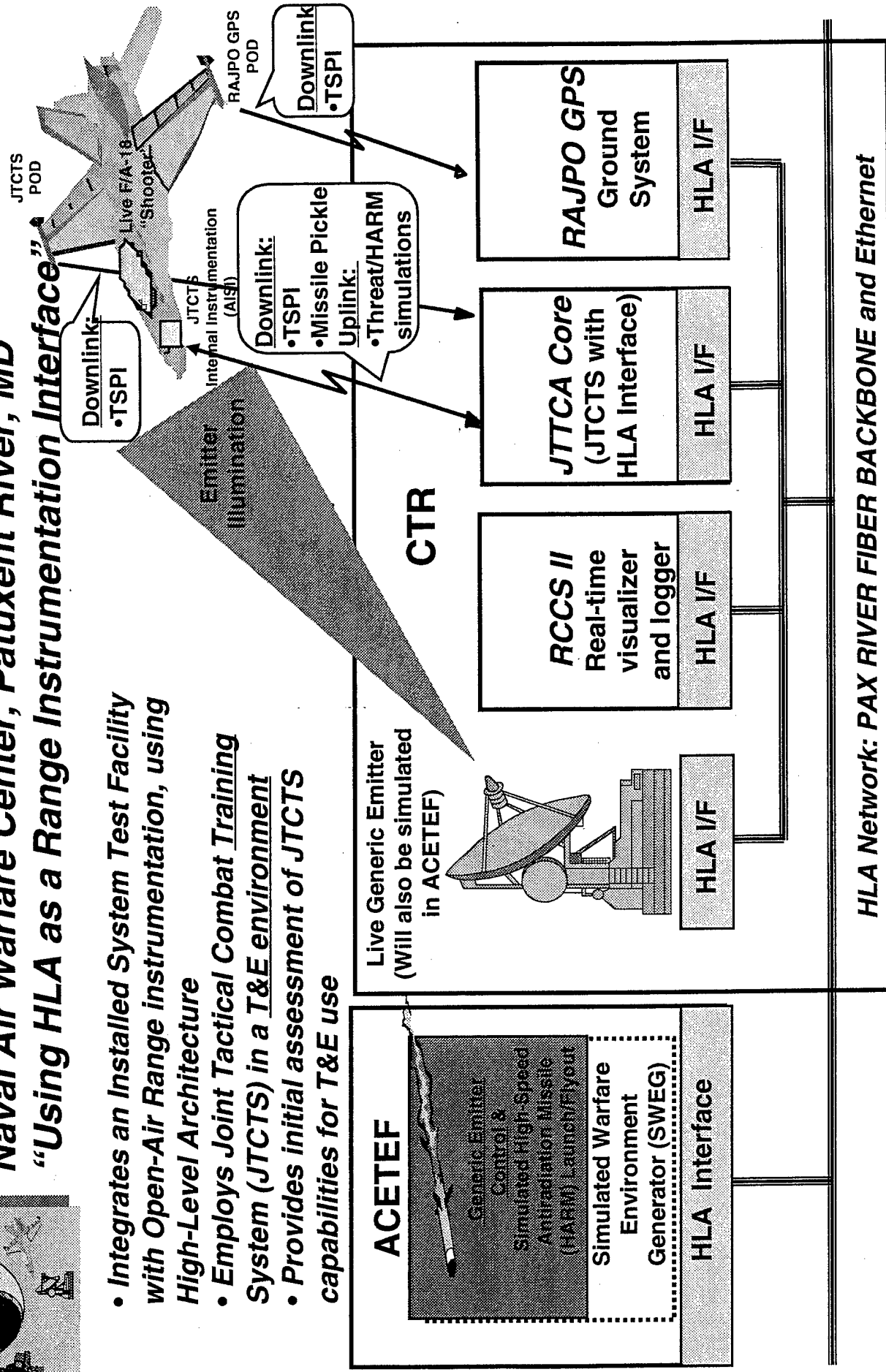
Assessment Methodology

- To assess HLA in a T&E environment including an open-air range (OAR) and an installed system test facility (ISTF), the JTTCA team designed and implemented the JTTCA HLA federation at the Naval Air Warfare Center Aircraft Division (NAWCAD) , Patuxent River, MD.

- The JTTCA HLA federation includes federates within the Atlantic Test Range (ATR) open-air range and the Air Combat Environment Test and Evaluation Facility (ACETEF) Installed System Test Facility .

- ATR and ACETEF are part of the Atlantic Ranges and Facilities complex at Patuxent River, and are located several miles apart. They are interconnected via the Aircraft Interoperability Center (AIC) fiber-optic OC-12 link.
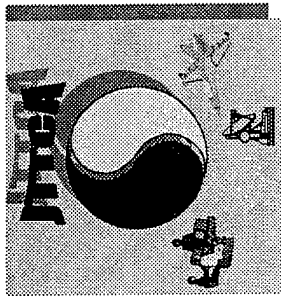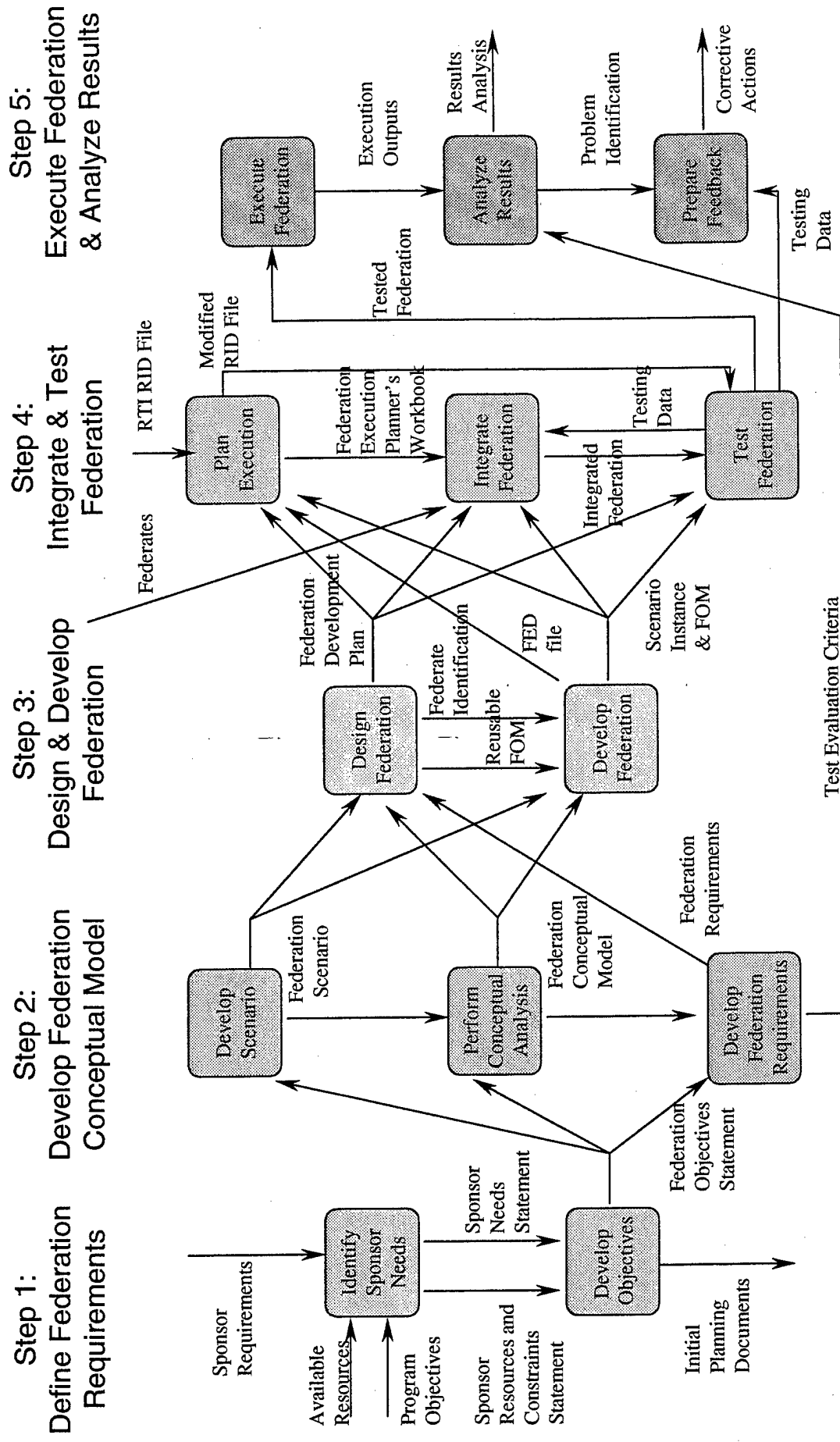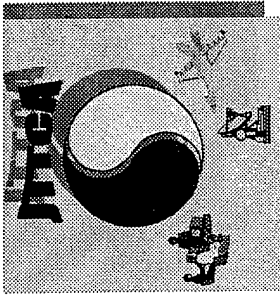
Joint Test and Training Capability Assessment (JTTCA) OAR/ISTF HLA Exercise at Chesapeake Test Range, Naval Air Warfare Center, Patuxent River, MD
"Using HLA as a Range Instrumentation Interface"

- Integrates an Installed System Test Facility with Open-Air Range instrumentation, using High-Level Architecture
- Employs Joint Tactical Combat Training System (JTCTS) in a T&E environment
- Provides initial assessment of JTCTS capabilities for T&E use

RAJPO GPS POD

Downlink: •TSPI

JTCTS POD

Live F/A-18 "Shooter"

Internal Instrumentation (AIS)

JTCTS Internal Instrumentation

Downlink: •TSPI

Downlink: •TSPI •Missile Pickle Uplink: •Threat/HARM simulations

Emitter Illumination

RAJPO GPS Ground System — HLA I/F

JTTCA Core (JTCTS with HLA Interface) — HLA I/F

RCCS II Real-time visualizer and logger — HLA I/F

CTR

Live Generic Emitter (Will also be simulated in ACETEF) — HLA I/F

ACETEF

Generic Emitter Control & Simulated High-Speed Antiradiation Missile (HARM) Launch/Flyout

Simulated Warfare Environment Generator (SWEG)

HLA Interface

HLA Network: PAX RIVER FIBER BACKBONE and Ethernet

JTTCA Federation Development: JTTCA FEDEP Model (V1.2)

Step 1:
Define Federation Requirements

Step 2:
Develop Federation Conceptual Model

Step 3:
Design & Develop Federation

Step 4:
Integrate & Test Federation

Step 5:
Execute Federation & Analyze Results

Step 1 blocks:

Sponsor Requirements →

Available Resources →
Program Objectives →

Identify Sponsor Needs

Sponsor Needs Statement →

Sponsor Resources and Constraints Statement

Develop Objectives

Initial Planning Documents →

Federation Objectives Statement

Step 2 blocks:

Develop Scenario

Federation Scenario →

Perform Conceptual Analysis

Federation Conceptual Model →

Develop Federation Requirements

Federation Requirements →

Test Evaluation Criteria

Step 3 blocks:

Design Federation

Federate Identification

Reusable FOM →

Develop Federation

Federation Development Plan

FED file

Scenario Instance & FOM

Step 4 blocks:

RTI RID File →

Plan Execution

Federation Execution Planner's Workbook →

Integrate Federation

Integrated Federation →

Test Federation

Testing Data

Federates

Modified RID File

Tested Federation

Step 5 blocks:

Execute Federation

Execution Outputs →

Analyze Results

Results Analysis →

Problem Identification →

Prepare Feedback

Corrective Actions →

Testing Data

Three JTTCA Tests

- **Combined Gateway Testing (CGT): Completed January, 2000**
  - Tested the ability of the JTTCA Federates to function as an integrated High Level Architecture (HLA) Federation with a simulated JTTCA Core Federate (JCF). The JCF is the JTTCA functional configuration of the JTCTS Mobile Core.
  - Assessed the performance of HLA in the Test and Evaluation environment of Atlantic Ranges and Facilities, Patuxent River, Maryland.
  - The CGT showed that the JTTCA federates can be integrated using HLA rules and tools to perform a pre-planned test scenario. The CGT included integrating the JTTCA federates such that data was interchanged between them in near real-time using HLA protocols. Interchanged data included Time-Space Position Information (TSPI) data, weapon fire signals, weapon detonate signals, and emitter mode change commands. Completion of the CGT indicated readiness to proceed with the FEET.

- **Federation End-to-End Test (FEET): Completion TBD**
  - Tests the ability of the JTTCA Federates to function as an integrated HLA Federation, including the actual JCF – i.e., a JTCTS Mobile Core with the HLA interface.

- **Live Open-Air Exercise (LOAE): Completion TBD**
  - Tests the ability of the JTTCA Federates to function as an integrated HLA Federation, including the actual JCF, in an exercise scenario with a live aircraft flying on the Atlantic Test Range.
  - Tests and assesses the capabilities of the JCF and JTCTS data link to function in a live Test and Evaluation exercise scenario.

JTTCA HLA Federation
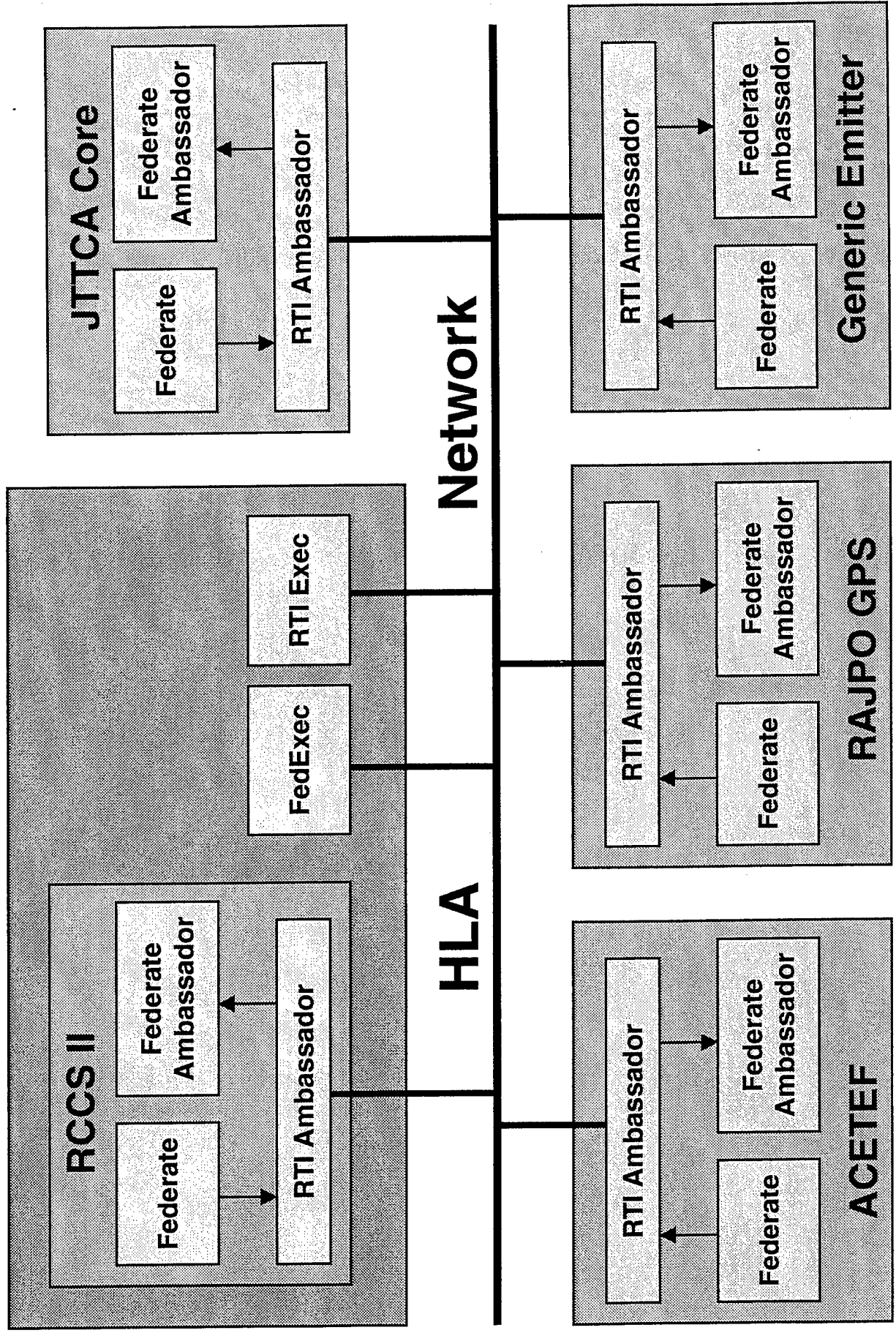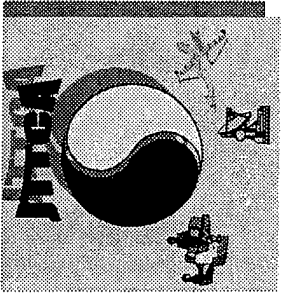
# Test Data Collection, Analyses and Results - the JTTCA Partial Test and Assessment Report (PTAR)

Data Collection

- For each test run, all HLA data transmitted or received by each federate was collected in a separate binary log file by an HLA data logger.

- The HLA data in the binary log files was processed after the test runs using a log file reader application, called the *JTTCA Log File Reader*, which was developed in-house.

- The JTTCA reader has a graphical user interface (GUI) which allows data to be selected for analysis using a set of user-selectable filters. The reader generates human-readable ASCII files that were analyzed in different ways to achieve the goals of the particular data analyses.

Analyses

- Examined the test run data at a high level

- Interface compliance document analysis: Examined sample data at a very low level

- Other analyses: Examined the data with respect to timing and message transfer reliability

Results were documented in the PTAR
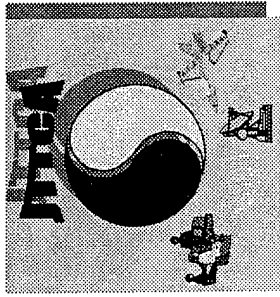
JTTCA Federation Analyses

During CGT, the following analyses were conducted, then documented in the PTAR:

- Overall Analysis
- Data Periodicity Analysis
- Time Stamp Considerations
- Time Order Analysis
- Message Transfer Reliability Analysis
- Message Transfer Latency Analysis
- Overall Conclusions and Recommendations
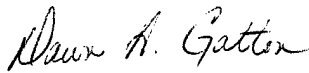
Evaluations and JTTCA Test Report Availability

During CGT, the following evaluations were conducted, then documented in the PTAR:

- **Evaluation of FEDEP Model 1.2**
- **Evaluation of DMSO Tools**
  - Object Model Development Tool (OMDT) Editor 1.3v4
  - Federation Execution Planner's Workbook (FEPW) Editor 1.3v3
- **Evaluation of the JTTCA Log File Reader**
- **Evaluation of the Ease of HLA Implementation**
- **Evaluation of Reusability of the HLA Federation Design**
- **22 "HLA lessons learned" were documented in the PTAR**

- **JTTCA Test Report (PTAR) is available electronically (MS Word file) to U.S. government agencies and their contractors by e-mailing Mike Payne at payneML@navair.navy.mil**
- **Requests from other organizations can be made in writing to: Naval Air Systems Command, 47123 Buse Road, Patuxent River, Maryland 20670-1547.**

5200
721200A
13 September 2000

From: Team Leader, Technical Publishing Team, Naval Air Warfare Center Aircraft Division, 22133 Arnold Circle, Patuxent River, Maryland 20670-1551
To: Defense Technical Information Center, 8725 John J. Kingman Road, Suite 0944, Fort Belvoir, VA 22060-6218

Subj: SUBMITTAL OF PROFESSIONAL PAPERS

1. Enclosed are professional papers for your retention. All have been cleared for public release with unlimited distribution.

2. Please contact Dawn Gatton at (301) 342-1710 should you have any questions.

DAWN A. GATTON
Acting